

MIL-T-23426D(AS)
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 Superseding
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MILITARY SPECIFICATION

TENSION BAR/RELEASE ELEMENT, AIRCRAFT LAUNCHING

This specification is approved for use within the Naval Air Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Purpose. This specification covers requirements for the procurement of tension bars/release elements (TB/RE) of the types and part numbers shown in 1.2. Frangible elements that are used to launch nose gear launch aircraft are referred to as release elements.

1.2 Classification. The tension bar/release element (TB/RE) shall be classified by type as follows in Table I:

TABLE I. Type Classification

TYPE	TYPE OF MATERIAL OR PROCESS	NAEC PART NUMBER	BREAKING STRENGTH	
			POUNDS	NEWTONS
I	Hollow Bar	502822-4	28,500 \pm 1500	126,774 \pm 6,672
II	Solid Bar	513436-1	36,200 \pm 1500	161,025 \pm 6,672
		413745-1	38,000 \pm 1500	169,032 \pm 6,672
		417599-1	53,000 \pm 1500	235,755 \pm 6,672
		506409-1	63,000 \pm 1890	280,237 \pm 8,407
		508713-1	63,000 \pm 1890	280,237 \pm 8,407
III	Forging	517891-1	46,453 \pm 1353	206,632 \pm 6,018

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be address to: NAVAL AIR ENGINEERING CENTER, SYSTEMS ENGINEERING AND STANDARDIZATION DEPARTMENT (CODE 93), Lakehurst, NJ 08733-5100, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

MIL-T-23426D(AS)

2. APPLICABLE DOCUMENTS

2.1 Government Documents.

2.1.1 Specifications and Standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

Federal

L-P-378	Plastic Sheet and Strip, Thin Gauge, Polyolefin
P-D-680	Dry Cleaning Solvent
TT-L-32	Lacquer, Cellulose Nitrate, Gloss and Aircraft Use
PPP-B-636	Box, Shipping, Fiberboard
PPP-B-640	Box, Fiberboard, Corrugated, Triple-Wall
PPP-F-320	Fiberboard, Corrugated and Solid, Sheet Stock (Container Grade) and Cut Shapes

Military

MIL-P-116	Preservation, Methods of
MIL-S-5000	Steel, Chrome-Nickel-Molybdenum (E4340) Bars and Reforging Stock
MIL-S-6758	Steel, Chrome-Molybdenum (4130) Bars and Reforging Stock (Aircraft Quality)
MIL-H-6875	Heat Treatment of Steel, Process For
MIL-F-7190	Forging, Steel, for Aircraft and Special Ordnance Applications
MIL-S-8699	Steel Bars and Forging Stock (4330) Vanadium Modified, Aircraft Quality
MIL-C-15074	Corrosion Preventive, Fingerprint Remover
MIL-P-23377	Primer Coating, Epoxy Polyamide, Chemical and Solvent Resistant
MIL-L-35078	Load Unit, Preparation of Nonperishable Subsistence Items, General Specification For

STANDARDS

Federal

FED-STD-151	Metals, Test Methods
FED-STD-595	Color

Military

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-147	Palletized Unit Loads

MIL-T-23426D(AS)

Military

MIL-STD-410	Nondestructive Testing Personnel Qualification and Certification (Eddy Current, Liquid Penetrant, Magnetic Particle, Radiographic and Ultrasonic)
MIL-STD-414	Sampling Procedures and Tables for Inspection by Variables for Percent Defective
MIL-STD-1944	Inspection, Magnetic Particle
MIL-STD-6866	Inspection, Liquid Penetrant

2.1.2 Other Government Documents and Drawings. The following other government documents and drawings form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

DRAWINGS

Naval Air Engineering Center

413745	Tension Bar, Holdback, F-8 Series, Noninterchangeable (Solid Type)
417599	Release Element (A-6, C-2, E-2)
423561	Fixture Adapters, S-3
502822	Tension Bar, Holdback-Tabulated (Hollow Type) (A-4, C-1)
506409	Tension Bar, Holdback, F-4, Noninterchangeable (Solid Type)
508713	Tension Bar, Holdback, A-3 Series, Noninterchangeable (Solid Type)
513436	Release Element (A-7)
517891	Release Element (S-3)
609480	Test Fixture, Tension Bar

(Copies of specifications, standards, drawings and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of Precedence. In the event of a conflict between the text of this specification and the reference cited herein (except for associated detail specifications, specification sheet or MS Standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. The tension bars/release elements (TB/RE) furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time set for opening of bids (See 4.3 and 6.3).

MIL-T-23426D(AS)

3.1.1 Qualification by TB/RE type. Contractors who qualify for a specific TB/RE type shall not necessarily be considered a qualified supplier for bars of that general type (See 4.3.2.3).

3.2 Materials. The metal for TB/RE shall be made in accordance with materials specified on applicable drawings.

3.3 Design and manufacturing processes. The design and manufacturing processes shall be in accordance with this specification and the following drawings: 413745, 417599, 423561, 502822, 506409, 508713, 513436, 517891 and 609480.

3.3.1 Manufacturing Sequence. The sequence of operations for the manufacture of TB/RE shall be as specified in 3.3.1 thru 3.3.1.7.

3.3.1.1 Forging. Forged TB/RE blanks shall be forged as specified in MIL-F-7190 Grade A and the applicable drawing.

3.3.1.2 Identification of TB/RE blanks. Each TB/RE lot shall be identified by the contractor quality control designation as specified in 3.5.1 at the time it is cut from the raw metal bar or forging stock. Each lot shall maintain its lot identity throughout the fabrication process. The minimum blank envelope shall be dimensionally as shown on the applicable drawing. This blank is heat treated prior to final machining.

3.3.1.2.1 Traceability. The contractor shall describe (See 6.5 and 6.8 for submittal time and addressee) his method of controlling TB/RE traceability from the end product back to heat treat lot to raw material bar/forging stock to mill heat number. Said procedure shall be retained by NAEC for possible future use necessitated by Fleet usage problems. The NAEC reserves the right to required adjustment to procedure if found inadequate for total traceability. Contractors having previously submitted traceability procedures may request a waiver of submission provided that the procedures previously submitted are fully applicable under the current contract.

3.3.1.3 Heating and quenching. The TB/RE blanks shall be heated and quenched in accordance with Table II. During heating and quenching all blanks shall be held vertically in separate areas of a wire basket or fixture. A minimum of one-quarter inch (6.35 mm) clearance shall separate all P/N 517891-1 blanks from another blank in the basket or fixture.

3.3.1.3.1 Heat treat lot identification. The contractor is required to identify each heat treat lot and correlate these lots with the TB/RE blank lot identification as specified in 3.3.1.2.

3.3.1.4 Preparation for hardness test. The TB/RE blanks shall be prepared for hardness testing by machining or grinding 0.030 (+.005, -.000) inch (0.762 + .127 - .000 mm) depth for a length of 0.50 inch (12.7 mm) over the location of the notched area, or at an adjacent location not less than 0.375 inch (9.53 mm) from the corner of the notch. The flatness and surface finish shall be as shown on the applicable drawing. Any proposed optional method to be used must be submitted to the Naval Air Engineering Center, Code 93, for approval prior to production.

MIL-T-23426D(AS)

TABLE II. Hardening requirements for TB/RE

PROCESS	MATERIAL		
	MIL-S-8699	MIL-S-6758	MIL-S-5000
1. Heat to	1550-1650°F 843-989°C	1575-1625°F 852-885°C	1500-1550°F 833-861°C
2. Hold temperature for	1 hour	1/2 hour	1 hour
3. Quench in	oil	brine (1)	oil
4. Temper or age (as applicable)	Approx. 1175°F, 635°C	950°F, 510°C or higher	Approx. 1175°F, 635°C
5. Hold temperature for	2 hours	2 hours	2 hours
6. Cool in	still air	still air	still air
7. Rockwell hardness range	C27-31	C27-31	C27-31

Notes: (1) Quench vertically in an agitated brine bath solution of 1 pounds (.680 kg) rock-salt per gallon of water. The bath shall not exceed 140°F (60°C) during quench. The bath shall be checked daily and shall show a hydrometer reading of 1.12.

3.3.1.4.1 Rockwell hardness range. Three Rockwell hardness tests shall be made on each TB/RE blank at the prepared surface as specified in 4.5.4. The variation in Rockwell hardness between all tension bar blanks cut from the same metal bar representing a lot (See 4.4.1.1) shall not exceed a two point range within the limits specified in Table II for the applicable material. Typical examples of acceptable hardness ranges are Rockwell C 27, 28, 29; 28, 29 and 30. Any TB/RE in a lot not conforming to the two point hardness range of the lot shall be discarded from the lot before continuing the manufacturing process. These TB/RE shall not be reheat treated and submitted for approval in another lot.

3.3.1.5 Determination of diameter in notched area.

3.3.1.5.1 Type I. For the Type I TB/RE, the hole under the notch shall be finished to the size and mechanical finish requirements shown on the applicable drawing.

MIL-T-23426D(AS)

3.3.1.5.2 Middle range for Rockwell hardness. For either the Type I, Type II or Type III TB/RE, a TB/RE having a Rockwell hardness corresponding to the middle of the range for the raw metal bar from which it was cut shall be selected for the test bar. The notched area diameter shall be ground or machined to the nominal size shown on the applicable drawing.

3.3.1.5.3 Test TB/RE data. The test TB/RE shall be pulled at a rate of 25,000 to 30,000 pounds per minute (111,206 to 133,447 newtons per minute) to determine the breaking load. From the results of this test, the notched area diameter required to produce the specified breaking load shall be calculated. Another TB/RE having a Rockwell hardness corresponding to the middle of the range for the TB/RE as in 3.3.1.5.2 shall be selected and the notched area diameter ground or machined to the calculated dimension plus or minus .001 inch (.0254 mm).

3.3.1.5.4 Type III Grain Flow. The grain flow shall be verified (4.5.5) to follow the contours of the metal as established by the forging process. A sample TB/RE shall be sent to NAEC (Code 91234) for approval each time there is a major change in the forging technique or process.

3.3.1.6 Final machining. If a pull test on this TB/RE confirms the specified breaking load, the remaining blanks shall be finished machined and the notched area diameter ground or machined to the same dimension plus or minus .001 inch (.0254 mm).

3.3.1.7 Quality control. At each manufacturing operation, each TB/RE shall be checked in and out on the production inspection report. Upon detection, at any stage of manufacture, a defective TB/RE shall be immediately mutilated and removed from the production run for disposal and the production inspection report so noted.

3.4 Heat treatment. The equipment requirements of Section 3 and the inspection and test procedures of Section 6 relating to the heat treating equipment of MIL-H-6875 (for steel) shall apply.

3.5 Identification of product. Letters and numbers shall be etched or metal stamped on the TB/RE as shown on the applicable drawings. When stamping is used, the TB/RE head shall be supported to prevent the stamping load from being applied to the notched area. Magnetic particle inspection and fluorescent penetrant inspection marking (when applicable) and part number, Federal Supply Code for Manufacturers, nominal breaking load (if required by the applicable drawing) and the contractor quality control designation shall be included.

3.5.1 Contractor quality control designation. The contractor quality control designation for each TB/RE shall consist of a lot number and a supplemental dash number. The lot number shall be assigned to each group of TB/RE which comprise a lot as specified in 4.4.1.2. Lot numbers shall begin with A1, A2, ... A99, B1, B2 and continue in alphanumeric sequence to Z99. The sequence shall continue using double letter alphanumeric AA-1 thru AA-99; AB-1 thru AB-99; AZ-1 thru AZ-99; BA-1 thru BA-99; BB-1 thru BB-99; BZ-1 thru BZ-99; thru ZZ-99 before upsetting the lot control number for each TR/RE

MIL-T-23426D(AS)

part number. The sequence shall be carried anew by the vendor into subsequent contracts so that any repeat numbers will occur only after many years. Letters I. L. O. Q. shall not be used. Each TB/RE within each lot shall be identified with a supplemental dash number. Examples of contractor quality control designations are: A1-1 through A1-60, A2-1 through A2-60, to Z99-1 through Z99-60.

3.5.2 Color coding for identification. The TB/RE shall be cleaned prior to application of primer and paint with materials and processes which have no deleterious effects on the bars. The TB/RE shall be treated and painted as shown in Table III with finish colors to FED-STD-595 applied as shown on the applicable drawings.

3.6 Hardness records. Records of the results of all hardness tests shall be maintained by the contractor.

3.7 Performance. The TB/RE shall satisfy the performance requirements specified in Section 3 when subjected to the applicable tests of Section 4.

3.8 Workmanship. The TB/RE shall be uniform in quality and shall be free from any irregularities or defects which might adversely affect performance. The items covered by this specification are used in launching military aircraft from aircraft carrier and shore-based catapults. These items were designed with a minimum margin of safety and are subjected to critical loading applications. Premature failure of any TB/RE can easily result in loss of life and destruction of the aircraft and constitute a servicing impediment to fleet readiness. The importance of providing a product of uniformly excellent quality cannot be over-emphasized. Manufacturing and processing methods shall conform to those standards of quality recognized by industry as essential.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of Section 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

MIL-T-23426D(AS)

TABLE III. TB/RE Paint System

Part No.	Wash Primer	PAINT SYSTEM			
		PRIMER		FINISH	
		No. Coats	Spec.	No. Coats	Spec
413745-1	1	1	MIL-P-23377	1	TT-L-32
417599-1	1	1	MIL-P-23377	1	TT-L-32
502822-4	1	1	MIL-P-23377	1	TT-L-32
506409-1	1	1	MIL-P-23377	1	TT-L-32
508713-1	1	1	MIL-P-23377	1	TT-L-32
513436-1	1	1	MIL-P-23377	1	TT-L-32
517891-1	1	1	MIL-P-23377	1	TT-L-32

NOTE: Colors to be used shall be in accordance with the applicable drawing.

4.2 Classification of inspection. The inspection requirements and testing of the TB/RE shall be classified as follows:

a. Qualification inspections. Qualification inspections are examinations and tests performed on samples submitted by a prospective qualifier for approval as qualified products in accordance with the Naval Air Systems Command letter of authorization. (See 6.3).

b. Quality conformance inspection.

1. Production-Lot inspections. Production-lot inspections are examinations and tests performed on samples submitted under contract to determine conformance of the products or lots with requirements set forth in the specification prior to acceptance.

2. Production control inspections. Production control inspections are examinations and tests performed at a test laboratory designated by the Government on random samples of assemblies produced under any contract. Samples shall be selected by the Government inspector.

MIL-T-23426D(AS)

4.3 Qualification inspections. Qualification inspections shall consist of the examinations and tests listed in Table IV.

4.3.1 Requalification. Qualification inspections in accordance with 4.3 shall be repeated every two years or as directed by the qualifying activity.

4.3.2 Samples for qualification inspection. Qualification samples shall be accompanied by the prospective qualifier's test reports (4.3.2.1) and certification letters of materials signed by the Government inspector. Qualification inspection samples shall consist of fifty (50) TB/RE for which qualification approval is required (See 3.1.1). Qualification samples shall be forwarded to the Commanding Officer, Naval Air Engineering Center, Code 00QA-1, Lakehurst, NJ 08733-5130. The samples shall be plainly identified by a securely attached metal or plastic tag marked with the following information:

"Samples submitted by (Name) (Date) for Qualification inspections in accordance with the requirements of MIL-T-23426(AS) under authorization (reference NAVAIR letter authorizing the tests)." "Part Number".

MIL-T-23426D(AS)

TABLE IV. Qualification Inspections

Inspection of Sequence Samples	TB/RE Stage	Inspection	Reference Paragraph	No. of Samples
1	Blank after heat treat	Hardness	4.5.4	All
2	Blank after heat treat	Examination	4.5.1	All
3	Finished (with notch) before painting	Examination	4.5.1	All
4	Finished before painting	Cleaning prior to 4.5.2	4.5.2.1	All
5	Finished (steel) before painting	Magnetic particle	4.5.2	All
6	Finished (Alum.) before painting	Fluorescent Inspection	4.5.3	All
7	Finished before painting	Cleaning after 4.5.2	4.5.2.2	All
8	Finished before painting	Tension	4.5.5	All
9	Finished before painting	Grain-flow structure (forging only)	4.5.6	One (may use broken tension sample)
10	Finished	Examination	4.5.1	All

4.3.2.1 Prospective qualifier's test report. Prior to forwarding qualification samples, 50 TB/RE shall have been tested by the prospective qualifier in accordance with Table IV. The test report shall include a detailed statement indicating compliance or extent of non-compliance with each requirement of this specification, referring specifically to the applicable paragraph numbers. The test report shall be submitted to NAVAIR (AIR-551) (Copy to NAEC, Code 91).

MIL-T-23426D(AS)

4.3.2.2 Qualification failure. Failure to meet any qualification inspection will result in rejection of the item and cessation of further tests.

4.3.2.3 Qualification samples. Qualification to supply TB/RE other than the samples submitted shall be restricted to those shown in Table V.

TABLE V Qualifications sample interrelationship

Part Number of Samples Submitted	TB/RE Qualified to Supply
413745-1	All, except 506409-1 and 517891-1
417599-1	All, except 506409-1 and 517891-1
502822-4	All, except 506409-1 and 517891-1
506409-1	All, except 517891-1
508713-1	All, except 506409-1 and 517891-1
513436-1	All, except 506409-1 and 517891-1
517891-1	All

4.4 Quality conformance inspections.

4.4.1 Production-Lot inspections. Production-Lot inspections performed by the contractor on all production lots shall consist of the examinations and tests listed in Table VI. TB/RE not meeting the specified requirements shall be rejected. If the selected TB/RE fail to meet the tension test specified, the lot shall be rejected.

MIL-T-23426D(AS)

TABLE VI. Production - Lot Inspections

Inspection of Sequence Samples	TB/RE Stage	Inspection	Reference Paragraph	No. of Samples
1	Blank after heat treat	Hardness	4.5.4	All
2	Blank after heat treat	Examination	4.5.1	All
3	Finished (with notch) before painting	Examination	4.5.1	All
4	Finished before painting	Cleaning prior to 4.5.2	4.5.2.1	All
5	Finished (steel) before painting	Magnetic particle	4.5.2	All
6	Finished (Alum.) before painting	Fluorescent Inspection	4.5.3	All
7	Finished before painting	Cleaning after 4.5.2	4.5.2.2	All
8	Finished before painting	Tension	4.5.5	One minimum
9	Finished before painting	Grain-flow structure	4.5.6	One
10	Finished	Examination	4.5.1	All

4.4.1.1 Inspection and test plan. The contractor shall submit an Inspection and Test Plan in accordance with Data Item Description UDI-R-21375 to cover production inspection and testing procedure to be employed during the life of the contract.

4.4.1.2 Inspection Lot. An inspection lot for TB/RE shall consist of all the bars cut from each raw metal bar or forging stock. However, it will not exceed 60 TB/RE. If the number of TB/RE machined from the raw metal bar or forging stock is too great to be heat treated together, then appropriate lot numbers shall be assigned to the number of TB/RE that can be heat treated together from each raw metal bar or forging stock. The unit of inspection shall be one TB/RE.

MIL-T-23426D(AS)

4.4.2 Initial contract award production process control sampling. When a newly qualified supplier is awarded his first contract to supply the TB/RE, the first ten (10) inspection lots shall be evaluated to determine acceptability in accordance with the sampling procedures as specified in MIL-STD-414, Section B, sampling plan for double specification limit with different AQL values (Example B-4 of MIL-STD-414). The sample size will be a function of the lot size as determined from Table A-2, and Table B-3 of MIL-STD-414, using Inspection Level IV. Under normal inspection the AQL for the upper specification limit shall be 2.5% and the AQL for the lower specification limit shall be 0.65%. The government representative shall randomly select the appropriate sample quantity from each lot and forward the samples to the Commanding Officer, Naval Air Engineering Center, Code 00QA-1, Lakehurst, NJ 08733-5130. Upon completion of the ten (10) lot sampling, NAEC shall advise the contractor and the Purchasing Contracting Officer (PCO) of the inspection results with recommendations for improved process controls if appropriate.

4.4.2.1 Production process control sampling after the first ten (10) lots. The production process control sampling after the first ten (10) lots shall be as specified in (a) or (b) below depending on the need for process control monitoring.

- a. In cases wherein extreme out-of-control conditions are evident from the sampling results, NAEC shall notify the PCO and the government representative as early as possible to the need for urgent corrective action. In such cases, MIL-STD-414 sampling may be retained up to and including a twenty-five (25) lot total to verify that corrective process controls have been instituted by the contractor.
- b. In the event inspection sampling shows evidence of adequate process controls, production control inspections shall be initiated in accordance with 4.4.3 for the balance of the contract.

4.4.3 Production control inspections. When the required sampling inspections (4.4.2) have been satisfied and upon completion of the production-lot inspections (4.4.1), three (3) random samples selected from each lot for production control inspections as specified in Table VII. These samples shall be forwarded to the Commanding Officer, Naval Air Engineering Center, Code 00QA-1, Lakehurst, NJ 08733-5130. Rejection of any sample for noncompliance with this specification or applicable drawings will result in rejection of the lot represented. Waivers may be processed against rejected lots for out-of-tolerance results as follows:

- a. Minor dimensional discrepancies
- b. Hardness values within one point range of tolerance limits
- c. When tension fracture value of one sample is low but within 150 pounds of low limit and average of all three values is within specification

MIL-T-23426D(AS)

- d. When tension fracture value of one sample is high but within 150 pounds of high limit and average of all three values is within specification.

NOTE: Lots rejected for breaking loads exceeding the upper limit may be re-submitted for testing after appropriate rework without waiver considerations.

Shipment of lots under consideration from the contractor's facility shall be contingent on satisfactory completion of the inspections specified in Table VII.

TABLE VII. Production Control Inspection

Tests	Reference Paragraph	Number of Samples
Visual Examination	4.5.1	3 Bars per lot
Magnetic particle inspection	4.5.2	3 Bars per lot
Fluorescent penetrant inspection	4.5.3	3 Bars per lot
Hardness	4.5.4	3 Bars per lot
Tension	4.5.5	3 Bars per lot

4.4.4 Preparation for delivery. The TB/RE shall be examined to ascertain that the preparation for delivery conforms to this specification.

4.5 Test methods.

4.5.1 Examination. The TB/RE shall be carefully examined for conformance with the applicable drawings and the requirements of this specification not covered by tests. Dimensional examination shall be performed prior to painting.

4.5.2 Magnetic particle inspection. Magnetic particle inspection personnel shall be certified in accordance with Level II or Level III per the procedure specified in MIL-STD-410. Proof of such qualification shall be made available for review by Government representative upon request. Magnetic particle inspection shall be conducted on steel TB/RE in accordance with MIL-STD-1949 performed by both circular and longitudinal method. The TB/RE shall be subjected to magnetic particle inspection over all surfaces including the

MIL-T-23426D(AS)

bore, when applicable. Open discontinuities shall not be permissible on any surface. No circular cracks shall be allowed in any areas where there is a change in the radius. Cracks in radius areas are critical and the TB/RE will be rejected for any radius cracks. In areas other than the notched area, scattered distinct magnetic particle indications shall not exceed 12 and none shall be greater than 5/8 inch (15.9 mm) long. Fuzzy indications, as associated with banding, in other than the notched area, shall not be cause for rejection. Banding shall be verified by wiping the inspected TB/RE and retesting the TB/RE without magnetizing after it has been wiped. If defects reoccur the TB/RE shall be rejected. There shall be no magnetic particle indications in the notched area.

4.5.2.1 Cleaning of TB/RE prior to magnetic particle inspection. Soak TB/RE for two (2) minutes in clean P-D-680 dry cleaning solvent or an industrial detergent or solvent. Remove TB/RE from solvent and wipe the entire piece with a clean cloth. All TB/RE shall be cleaned at a maximum of 24 hours prior to the actual magnetic particle inspection.

4.5.2.2 Cleaning of TB/RE after magnetic particle inspection. Clean the TB/RE as follows:

- a. Soak TB/RE for two (2) minutes in clean P-D-680 dry cleaning solvent or an industrial detergent or solvent.
- b. Remove from solvent and wipe the entire piece with a clean cloth.
- c. Clean unit employing a fingerprint remover as specified in MIL-C-15074.
- d. Wash unit with clean P-D-680 dry cleaning solvent or an industrial detergent or solvent.
- e. Dry entire unit with a clean, dry cloth or air dry.

CAUTION

AT NO TIME SHALL THE SURFACE OF THE TB/RE BE TOUCHED WITH BARE HANDS

4.5.3 Fluorescent penetrant inspection. Fluorescent penetrant inspection personnel shall be certified in accordance with the procedure specified in MIL-STD-410. Each finish machined aluminum alloy TB/RE shall be examined all over by the fluorescent penetrant process in accordance with MIL-STD-6866, Type I, Method A. The TB/RE shall not show any cracks, seams, or any other harmful discontinuities.

4.5.4 Hardness test. The TB/RE shall be tested for hardness in accordance with method 243 of FED-STD-151. The hardness of the TB/RE shall be as shown in Table II.

MIL-T-23426D(AS)

4.5.5 Tension test. The TB/RE shall be loaded at a rate of 25,000 to 30,000 pounds per minute (111,206 - 133,447 Newtons per minute) by applying the load as shown in the applicable diagram of NAEC 423561 or NAEC 609480. The breaking strength for each type and size TB/RE shall be in accordance with the value specified in the applicable tension bar drawing and 1.2, Table I.

4.5.6 Grain-flow structure. The Type III forged TB/RE shall be sectioned and suitably etched to show the grain flow structure. This sectioning procedure shall be repeated after any major change in the forging technique. The broken tension test sample may be used to verify the grain flow structure.

5. PACKAGING

5.1 Cleaning and preservation. The hollow portion of the Type I TB/RE shall be cleaned in accordance with process C-1 of MIL-P-116 and coated with either Type P-1 or P-19 preservation in accordance with Method I of MIL-P-116. No preservative compound shall be permitted on the painted surface of the Type I TB/RE. Type II and III TB/RE do not require a preservative compound.

5.2 Production-Lot packaging. Packaging shall be Level A as specified (see 6.2).

5.2.1 Packaging for Level A, B, or C: The TB/RE's shall be packaged by lot control. A lot of TB/RE's machined from a single length of stock (approximately 60 bars or less) shall be unit packaged per Method IC-2 of MIL-P-116, using two intermediate fiberboard boxes, not exceeding 30 TB/RE's per intermediate container. Fiberboard boxes shall conform to PPP-B-636, Type CF or SF, Class-Domestic Grade 275 psi, Variety DW. Each TB/RE shall be packaged in an upright position (lot/serial numbered end facing up) and securely held within the intermediate container by using criss-cross, half slotted interlocking corrugated fiberboard separators. A single corrugated fiberboard pad shall be used under and over (top and bottom) of the load to reinforce the intermediate container. Corrugated fiberboard pads and separators shall conform to PPP-F-320, Class Domestic. In order to effect the specified Method IC-2, each intermediate container shall be placed within a waterproof polyethylene bag, excess air exhausted and sealed. Bag material shall conform to L-P-378, or equivalent specification. Material must be transparent and minimum gauge of 6 mils. Unit boxes shall be sealed in accordance with the appendix to PPP-B-636, except that metal staples shall not be used. When lots are 30 TB/RE's or smaller, no more than one lot may be packaged per intermediate container and no more than two lots per unit container.

5.2.1.1 Intermediate packaging. Two unit packages with no more than 30 TB/RE in each, unit packaged as specified in 5.2.1, shall be packaged within an intermediate container conforming to PPP-B-640, Class 2 for contents over 100 pounds (45.36 kg) or a container conforming to PPP-B-636, Class Weather Resistant, Grade V3 (as a minimum) for contents up to 100 pounds (45.36 kg).

5.3 Packing. Packing shall be Level A or B as specified (See 6.2).

MIL-T-23426D(AS)

5.3.1 Packing for Levels A and B. Intermediate packs prepared as specified in 5.2.1.1 shall be prepared for shipment by palletizing or unitizing on expendable wood pallets capable of bearing loads up to 2,400 pounds (1,089 kg). A unit or palletized load shall not exceed 2,400 pounds (1,089 kg) gross weight. The preparation of the palletized load shall be in accordance with either MIL-L-35078 or MIL-STD-147. Insofar as practicable, palletized loads shall contain items of one part number, identical quantities and use uniform size and style pallets. A palletized load shall contain complete lots of TB/RE only.

5.4 Marking. Unit packages and exterior containers shall be marked in accordance with MIL-STD-129.

5.4.1 Additional marking. The following special marking shall be applied on each unit and intermediate container.

a. "TOP - OPEN THIS SIDE ONLY"

Serial number on TB/RE shall face the top of the container for quick inspection.

b. LOT NUMBER AND/OR SERIAL NUMBERS AND QUANTITY OF TB/RE IN THE LOT

c. "NOTICE - ISSUES SHALL BE MADE IN COMPLETE LOT QUANTITIES ONLY - DO NOT BREAK LOTS"

Note: Comingling of TB/RE from more than one lot in the unit packages is absolutely prohibited. When more than 60 TB/RE are fabricated from one lot of steel, necessitating exceeding the 30-TB/RE per container limitation, a waiver may be granted by directing a request to the Aviation Supply Office Code EPP.

6. NOTES

6.1 Intended use. This specification covers TB/RE that are intended to be used in military aircraft launchings. The TB/RE are designed to break at a specific tension load to release an aircraft from a catapult.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number, and date of this specification.

b. Part number of TB/RE.

c. Naval Air Engineering Center, Code 00QA, Lakehurst, NJ
08733-5130
to perform production control tests (See 4.4.3).

d. Selection of applicable levels of preservation, packaging, and packing.

MIL-T-23426D(AS)

- e. Upon contract award, but prior to production, the contractor shall be required to submit to NAEC, Code 00QA-1, his method of controlling TB/RE traceability (See 3.3.1.2.1 and 6.7).
- f. Records of the results of all hardness tests (See 3.6) shall be required to be maintained by the contractor for a period of not less than 36 months from the date of the contract award. If Fleet usage problems occur and it becomes necessary to examine the contractor's hardness records they shall be made available for examination by a Government inspector.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List (QPL-23426) whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is:

Commander
Naval Air Systems Command
Code AIR-551
Washington, DC 20361-5510

Information pertaining to qualification of products may be obtained from the above activity. Written requests shall specifically itemize the type and part numbers of the assemblies upon which qualification is desired.

6.3.1 Failure after qualification. If TB/RE fail to pass tests subsequent to qualification approval, the listing of the contractor's product for the type TB/RE qualified may be removed from the Qualified Products List at the option of the government.

6.3.1.1 Retesting for qualification. Retesting of the product shall not be authorized until satisfactory evidence is furnished to the activity responsible for qualification or its authorized agent that all of the defects which were disclosed by previous tests have been corrected.

6.3.1.2 Retesting costs. All cost for retesting samples submitted for qualification shall be borne by the contractor.

6.3.2 Production items. The production items supplied under contract should be identical every respect to the corresponding Government-approved qualification sample and drawings, except for changes which have been previously approved by the procuring activity (Attn: The Contracting Officer). Evidence of unauthorized change from the Government-approved sample or drawings will constitute cause for rejection of the lots and disqualification of the supplier.

MIL-T-23426D(AS)

6.4 Facility survey. As a preliminary to the qualification procedure and at any time during production, the Naval Air Engineering Center will survey manufacturing facilities to ascertain ability to manufacture and test TB/RE, meet government production schedules and to review design and engineering considerations. Manufacturing facilities considered unsatisfactory to the NAEC will be cause for rejection of the contractor's request for qualification (or cancellations of the contract where production is involved).

6.5 NAVAIR and NAEC. Where reference is made in this specification to NAVAIR correspondence, where required, it shall be addressed to:

Commander
Naval Air Systems Command
Code AIR-551
Washington, DC 20361-5510

Where NAEC is to be contacted the address shall be:

Commanding Officer
Naval Air Engineering Center
Code 91
Lakehurst, NJ 08733-5090

6.6 Contract data requirements. When this specification is used in a procurement which incorporates a DD Form 1423 and invokes the provisions of 7-104.9(n) of the Armed Services Procurement Regulations, the data requirements identified below will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of ASPR-7-104.9(n) are not invoked, the data specified below will be developed by the contractor in accordance with the contract requirements. Deliverable data required by this specification is cited in the following paragraphs:

Paragraph	Data Requirements	Applicable DID
3.3.1.2.1	Traceability	DI-R-30511 (paragraph 4.0 only)
4.3.2.1	Test Reports Prior to Qualification	DI-T-5329
4.4.1.1	Inspection and Test Plan	UDI-R-21375

6.7 Samples, tests and transportation costs. The cost of the initial qualification samples and their transportation to the testing laboratory are to be paid by the prospective qualifier. The cost of production samples and their tests are to be paid by the Government but the transportation of these samples to the test facility are to be paid by the manufacturer.

MIL-T-23426D(AS)

6.8 Subject Term (Key Word) Listing.

Aircraft, Launching Tension Bar/Release Element
Launching, Tension Bar/Release Element, Aircraft
Release Element/Tension Bar, Aircraft Launching
Tension Bar/Release Element, Aircraft Launching.

6.9 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing Activity:

NAVY - AS

(Project No. 1720-N015)

MIL-T-23426D(AS)

TABLE OF CONTENTS

SECTION	TITLE	PAGE
1.	SCOPE	
1.1	Purpose	1
1.2	Classification	1
2.	APPLICABLE DOCUMENTS	
2.1	Government Documents	2
2.1.1	Specifications and Standards	2
2.1.2	Other Government Documents and Drawings	2
2.2	Order of Precedence	3
3.	REQUIREMENTS	
3.1	Qualification	3
3.1.1	Qualification by TB/RE type	3
3.2	Materials	4
3.3	Design and manufacturing processes	4
3.3.1	Manufacturing Sequence	4
3.3.1.1	Forging	4
3.3.1.2	Identification of TB/RE blanks	4
3.3.1.2.1	Traceability	4
3.3.1.3	Heating and quenching	4
3.3.1.3.1	Heat treat lot identification	4
3.3.1.4	Preparation for hardness test	4
3.3.1.4.1	Rockwell hardness range	4
3.3.1.5	Determination of diameter in notched area	5
3.3.1.5.1	Type I	5
3.3.1.5.2	Middle range for Rockwell hardness	5
3.3.1.5.3	Test TB/RE data	6
3.3.1.5.4	Type III Grain Flow	6
3.3.1.6	Final machining	6
3.3.1.7	Quality control	6
3.4	Heat treatment	6
3.5	Identification of product	6
3.5.1	Contractor quality control designation	6
3.5.2	Color coding for identification	6
3.6	Hardness records	7
3.7	Performance	7
3.8	Workmanship	7
4.	QUALITY ASSURANCE PROVISIONS	
4.1	Responsibility for inspection	7
4.1.1	Responsibility for compliance	7
4.2	Classification of inspection	7
4.3	Qualification inspections	8
4.3.1	Requalification	9
4.3.2	Samples for qualification inspection	9
4.3.2.1	Prospective qualifier's test report	9
4.3.2.2	Qualification failure	10
		11

MIL-T-23426D(AS)

TABLE OF CONTENTS

SECTION	TITLE	PAGE
4.3.2.3	Qualification samples	11
4.4	Quality conformance inspections	11
4.4.1	Production-Lot inspections	11
4.4.1.1	Inspection and test plan	12
4.4.1.2	Inspection Lot	12
4.4.2	Initial contract award production process control sampling	13
4.4.2.1	Production process control sampling after first ten (10) lots	13
4.4.3	Production control inspections	13
4.4.4	Preparation for delivery	14
4.5	Test methods	14
4.5.1	Examination	14
4.5.2	Magnetic particle inspection	14
4.5.2.1	Cleaning of TB/RE prior to magnetic particle inspection	15
4.5.2.2	Cleaning of TB/RE after magnetic particle inspection	15
4.5.3	Fluorescent penetrant inspection	15
4.5.4	Hardness test	15
4.5.5	Tension test	16
4.5.6	Grain-flow structure	16
5.	PACKAGING	16
5.1	Cleaning and preservation	16
5.2	Production-Lot packaging	16
5.2.1	Packaging for Level A, B, or C	16
5.2.1.1	Intermediate packaging	16
5.3	Packing	16
5.3.1	Packing for Levels A and B	17
5.4	Marking	17
5.4.1	Additional marking	17
6.	NOTES	17
6.1	Intended use	17
6.2	Ordering data	17
6.3	Qualification	18
6.3.1	Failure after qualification	18
6.3.1.1	Retesting for qualification	18
6.3.1.2	Retesting costs	18
6.3.2	Production items	18
6.4	Facility survey	19
6.5	NAVAIR and NAEC	19
6.6	Contract data requirements	19
6.7	Samples, tests and transportation costs	19
6.8	Subject Term (Key Word) Listing	20
6.9	Changes from previous issue	20

MIL-T-23426D(AS)

TABLES

I	Type Classification	1
II	Hardening requirements for TB/RE	5
III	TB/RE Paint System	8
IV	Qualification inspections	10
V	Qualification sample interrelationship	11
VI	Production-Lot inspections	12
VII	Production control inspection	14

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